

**CLAIMS:**

What is claimed is:

- 5      1. A method, in a data processing system, for resource allocation of a plurality of tasks carrying penalties based on their completion time, the method comprising:
  - assigning the plurality tasks to one or more resources; and
  - assigning start times for the plurality of tasks such that expected penalties for completion times of the plurality of tasks are minimized.
- 10     2. The method of claim 1, wherein expected penalties are minimized by continually assigning tasks and start times based on predictable potential next events.
- 15     3. The method of claim 1, further comprising:
  - allocating thinking time into separate thinking time partitions for predictable potential next events;
  - during each allocated thinking time partition, allocating resources for a predicted next event at a predicted time at which the predicted next event may occur; and
  - assigning resources for queued tasks based upon an actual next event and an actual time of occurrence.
- 20     4. The method of claim 3, wherein the step of allocating thinking time includes:
  - reserving a first amount of time for performing an initial algorithm; and
  - allocating a second amount of time for performing a randomized algorithm.

5. The method of claim 4, wherein the step of allocating resources for a predicted next event at a predicted time at which the predicted next event may occur includes:
  - executing the initial algorithm to form a preliminary solution;
  - recording a seed value of zero to indicate that a current solution is the preliminary solution; and
  - repeatedly executing the randomized algorithm until an event occurs or the second amount of time expires.
6. The method of claim 5, further comprising:
  - 10 responsive to the randomized algorithm forming a solution that is better than a previous solution, updating the seed value.
7. The method of claim 5, wherein the step of assigning resources for queued tasks based upon an actual next event and an actual time of occurrence includes:
  - 15 determining whether a best solution was found using the initial algorithm or the randomized algorithm; and
  - responsive to the best solution being found using the initial algorithm, executing the initial algorithm and assigning resources based on results of the initial algorithm.
- 20 8. The method of claim 7, further comprising:
  - responsive to the best solution being found using the randomized algorithm, executing the randomized algorithm using the seed value and assigning resources based on results of the randomized algorithm.
- 25 9. The method of claim 8, further comprising:
  - assigning only immediately starting tasks.

10. The method of claim 5, wherein an event is one of a job arrival, a task completion, a data change arrival, a managerial schedule request, and a termination request.

5 11. The method of claim 10, wherein a job includes one or more tasks.

12. A method, in a data processing system, for solving a problem, the method comprising:

10       allocating a first amount of time for performing an initial algorithm;  
          allocating a second amount of time for performing a randomized algorithm;  
          executing the initial algorithm to form a preliminary solution;  
          recording a seed value of zero for the preliminary solution;  
          repeatedly executing the randomized algorithm until an event occurs or a  
          predetermined amount of time expires;  
15        responsive to the randomized algorithm forming a solution that is better than a  
          previous solution, updating the seed value; and  
          presenting a best solution based on the seed value.

13. An apparatus, in a data processing system, for resource allocation of a plurality of  
20 tasks carrying penalties based on their completion time, the apparatus comprising:  
          means for assigning the plurality tasks to one or more resources; and  
          means for assigning start times for the plurality of tasks such that expected  
          penalties for completion times of the plurality of tasks are minimized.

25 14. A computer program product, in a computer readable medium, for resource allocation of a plurality of tasks carrying penalties based on their completion time, the computer program product comprising:

instructions for assigning the plurality tasks to one or more resources; and  
instructions for assigning start times for the plurality of tasks such that expected  
penalties for completion times of the plurality of tasks are minimized.

5        15.      The computer program product of claim 14, wherein expected penalties are  
minimized by continually assigning tasks and start times based on predictable potential  
next events.

10        16.      The computer program product of claim 14, further comprising:  
instructions for allocating thinking time into separate thinking time partitions for  
predictable potential next events;  
instructions for allocating resources, during each allocated thinking time partition,  
for a predicted next event at a predicted time at which the predicted next event may  
occur; and  
15        instructions for assigning resources for queued tasks based upon an actual next  
event and an actual time of occurrence.

17.      The computer program product of claim 16, wherein the instructions for  
allocating thinking time includes:  
20        instructions for reserving a first amount of time for performing an initial  
algorithm; and  
instructions for allocating a second amount of time for performing a randomized  
algorithm.

25        18.      The computer program product of claim 17, wherein the instructions for  
allocating resources for a predicted next event at a predicted time at which the predicted  
next event may occur includes:

- instructions for executing the initial algorithm to form a preliminary solution;
- instructions for recording a seed value of zero to indicate that a current solution is the preliminary solution; and
- instructions for repeatedly executing the randomized algorithm until an event
- 5 occurs or the second amount of time expires.
19. The computer program product of claim 18, further comprising:
- instructions for responsive to the randomized algorithm forming a solution that is better than a previous solution, updating the seed value.
- 10
20. The computer program product of claim 18, wherein the instructions for assigning resources for queued tasks based upon an actual next event and an actual time of occurrence includes:
- instructions for determining whether a best solution was found using the initial
- 15 algorithm or the randomized algorithm; and
- instructions for responsive to the best solution being found using the initial algorithm, executing the initial algorithm and assigning resources based on results of the initial algorithm.
- 20 21. The computer program product of claim 20, further comprising:
- instructions, responsive to the best solution being found using the randomized algorithm, for executing the randomized algorithm using the seed value and assigning resources based on results of the randomized algorithm.
- 25 22. The computer program product of claim 21, further comprising:
- instructions for assigning only immediately starting tasks.

23. The computer program product of claim 18, wherein an event is one of a job arrival, a task completion, a data change arrival, a managerial schedule request, and a termination request.
- 5 24. The computer program product of claim 23, wherein a job includes one or more tasks.